

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



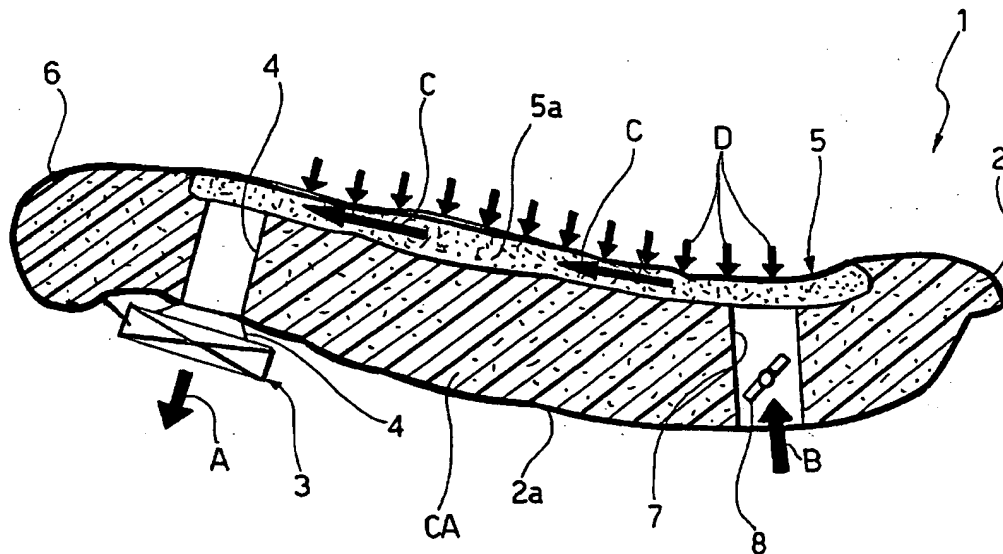
(43) International Publication Date  
25 January 2001 (25.01.2001)

PCT

(10) International Publication Number  
**WO 01/05623 A1**

- (51) International Patent Classification<sup>7</sup>: B60N 2/56 [IT/IT]; c/o Lear Corporation Italia Spa, Corso Allamano, 32, I-10095 Grugliasco (IT).
- (21) International Application Number: PCT/EP00/05305
- (22) International Filing Date: 8 June 2000 (08.06.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
TO99A000641 20 July 1999 (20.07.1999) IT
- (71) Applicant (for all designated States except US): LEAR CORPORATION [US/US]; 21557 Telegraph Road, Southfield, MI 48304 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): ENRIETTI, Luca
- (74) Agent: BUZZI, NOTARO & ANTONIELLI d'OULX SRL; Corso Fiume, 6, I-10133 Torino (IT).
- (81) Designated States (national): JP, US.
- (84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- Published:  
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: VENTILATED MOTOR VEHICLE SEAT



(57) Abstract: A motor vehicle seat comprises foam plastic padding which incorporates, adjacent to the area in contact with the user's body, a porous support mattress having limited flexibility and high permeability that defines a system of passages for the air communicating at one end with at least one air inlet duct (7), which is provided with a throttle valve (8), and at the other end with a main duct (4) fitted with a fan (3) for setting up the circulation of air from the inlet duct to the outlet duct through the passages defined by the abovementioned porous mattress adjacent to the area of contact with the user's body.



WO 01/05623 A1

**"Ventilated motor vehicle seat"**

The present invention relates to motor vehicle seats of the type comprising plastic foam padding, a cover, for the said padding, that is porous in at least one area in contact with the user's body, and a system of passages running through the padding and ending in at least one main duct provided with ventilation means for setting up a flow of ventilating air through the said passages. Motor vehicle seats of the type indicated above are already known and used. In these known solutions, the abovementioned ventilation means consist of an extractor fan or a blowing fan generating a flow of air which passes through the abovementioned passages and the porous cover of the padding in order to give adequate ventilation to the body of the seated person. One problem with these solutions is that they cannot be regulated without varying the speed of the fan, and their operation is furthermore nonuniform for varying dimensions of the body of the occupant because of the fact that a variable proportion of the permeable surface of the cover is blocked by the user's own body.

In order to obviate these drawbacks, the subject of the invention is a motor vehicle seat of the type indicated at the outset, characterized in that the abovementioned system of passages comprises a porous support mattress having limited flexibility and high permeability that is positioned adjacent to the surface in contact with the user's body, the said passages being in communication at one end with the abovementioned main duct and at a second end with at least one auxiliary duct that is open to the exterior, both of the said main and auxiliary ducts being formed in the body of plastic foam material of the padding, in such a way that starting the abovementioned ventilation

means creates a flow of air through the said porous mattress, parallel with and adjacent to the surface in contact with the user's body, at least one of the said main and auxiliary ducts also being provided with a  
5 throttle valve.

The abovementioned ventilation means may consist of an extractor fan (in which case the main duct in which the fan is fitted acts as the outlet duct) or a blowing fan (in which case the main duct is  
10 the inlet duct). Alternatively the main duct may be connected to the air conditioning system of the motor vehicle and act for example as the inlet duct.

With the arrangement described above the seat according to the invention is able to ensure more  
15 efficient and reliable ventilation than the known systems described earlier. The system according to the invention is capable of operating at a lower pressure and increased air flowrate than the abovementioned known systems. Furthermore the loss of head/air  
20 flowrate characteristic can be varied by throttling the abovementioned duct containing the throttle valve, without altering the fan speed.

Other features and advantages of the invention will be apparent from the following description which  
25 refers to the attached drawings, in which:

Figure 1 is a diagrammatic sectional view of a cushion for a motor vehicle seat according to the invention.

Figure 2 is a diagrammatic plan view of the  
30 cushion of Figure 1, and

Figure 3 illustrates a variant of Figure 1.

The drawings illustrate the application of the invention to a motor vehicle seat cushion, although it should be understood that the invention is equally  
35 applicable to a backrest. The number 1 indicates the

whole of the structure of the cushion which incorporates a padding element 2, consisting of foam plastic, for example, which is designed to be mounted on a frame (not shown), typically of metal.

5           The front end of the cushion 1 is provided on its underside with a fan 3 fitted to an air duct 4 mounted underneath the padding 2. At the fan 3 end, the padding 2 contains a main duct 4 which passes vertically through the padding 2 from its undersurface  
10 2a to a sunken surface 5a in the upper face of the cushion 1. This sunken surface receives a porous mattress 5 which may also consist of a foam plastic, for example, attached by any known method, for example adhesive bonding, to the body 2 of the padding. The  
15 mattress 5 acts as a support mattress and has limited flexibility and high permeability. The body of the cushion, including the mattress 5, is covered with a cover 6 of porous material, for example a fabric.

          Formed in the rear of the body of the padding 2  
20 are three auxiliary through ducts 7 containing butterfly valves 8 controlled by a single shaft 9 operated by an actuator device 10 of any known type (see Figure 2).

          The fan 3 is made in such a way as to tend to  
25 draw air in the direction of the arrow A in Figure 1 in order to set up a flow of ventilating air that passes into the auxiliary ducts 7, which therefore act as inlet ducts (arrow B), passes through the porous mattress 5 parallel with and adjacent to the upper  
30 surface of the cushion (arrow C) and passes out through the main duct 4 and the fan 3 (arrow A). The suction action of the fan 3 also tends to draw air from the outside into the porous mattress 5 through the pores of the cover 6 (arrow D).

The actuator 10, which may be of any known type, may be controlled directly by the driver, or automatically by a central electronic control unit on the basis of any predetermined criterion for throttling the suction ducts 7, so as to be able to vary the loss of head/air flowrate characteristic without having to regulate the fan speed.

One of the major advantages of the invention is that the good operation and efficiency of the ventilation are not influenced by potential obstruction of the pores of the cushion cover caused by direct contact with the body of the user.

Figure 3 shows a variant in which the air conditioning system of the motor vehicle is connected directly to a connector 11 situated in an inlet duct 12 in order to blow air into the cushion. In this case the valves 8 are fitted in outlet ducts 13.

Clearly, without altering the principle of the invention, the details of construction and the forms of embodiment can vary considerably from those described and illustrated purely by way of example, without thereby departing from the scope of the present invention.

CLAIMS

1. Motor vehicle seat comprising plastic foam padding (2), a cover (6), for the said padding (2),  
5 that is porous in at least one area in contact with the user's body, and a system of passages (5) running through the padding (2) and ending in at least one main duct (4) provided with ventilation means (3) for setting up a flow of ventilating air through the said  
10 passages,  
characterized in that the abovementioned system of passages is defined by a porous support mattress (5) having limited flexibility and high permeability that is positioned adjacent to the surface in contact with  
15 the user's body, the said passages being in communication at one end with the abovementioned main duct (4) and at a second end with at least one auxiliary duct (7) that is open to the exterior, both of the said main and auxiliary ducts (4, 7) being  
20 formed in the body of plastic foam material (2) of the padding, in such a way that starting the abovementioned ventilation means (3) creates a flow of air through the said porous mattress (5), parallel with and adjacent to the surface in contact with the user's body, while a  
25 throttle valve is fitted in the said auxiliary duct (7).
2. Seat according to Claim 1, characterized in that the abovementioned ventilation means consist of an extractor fan or a blowing fan.
- 30 3. Seat according to Claim 1, characterized in that the said main duct (12) is provided with a connector (11) for connection to the air conditioning system of the motor vehicle, which therefore acts as the abovementioned ventilation means.

4.       Seat according to Claim 1, in which the abovementioned arrangement is applied to a seat cushion, characterized in that the auxiliary duct (7) is located in the rear part of the cushion and extends  
5       vertically, while the main duct (4) is situated in the front part of the cushion and is also directed vertically.

5.       Seat according to Claim 4, characterized in that a plurality of mutually parallel auxiliary ducts  
10       (7) is provided in the rear part of the cushion.

6.       Seat according to Claim 5, characterized in that the throttle valve in each auxiliary duct (7) is a butterfly valve (8), the said seat being provided with a single control device (9, 10) for simultaneously  
15       controlling the butterfly valves (8) fitted to the abovementioned auxiliary ducts (7).

7.       Seat according to Claim 1, characterized in that the abovementioned porous mattress is made of plastic foam material and is laid on top of a sunken  
20       surface (5a) on the upper face of the cushion of the seat.

8.       Seat according to Claim 1, in which the abovementioned arrangement is applied to a seat back.

FIG. 1

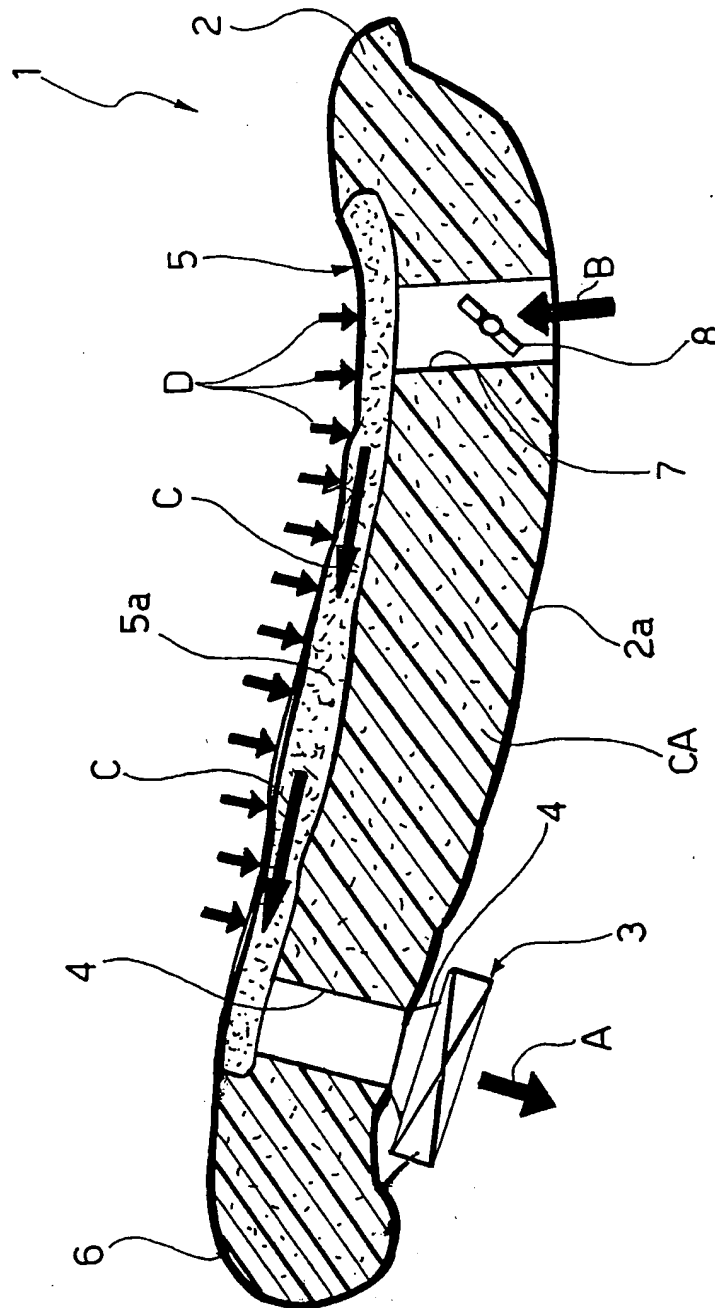




FIG. 2

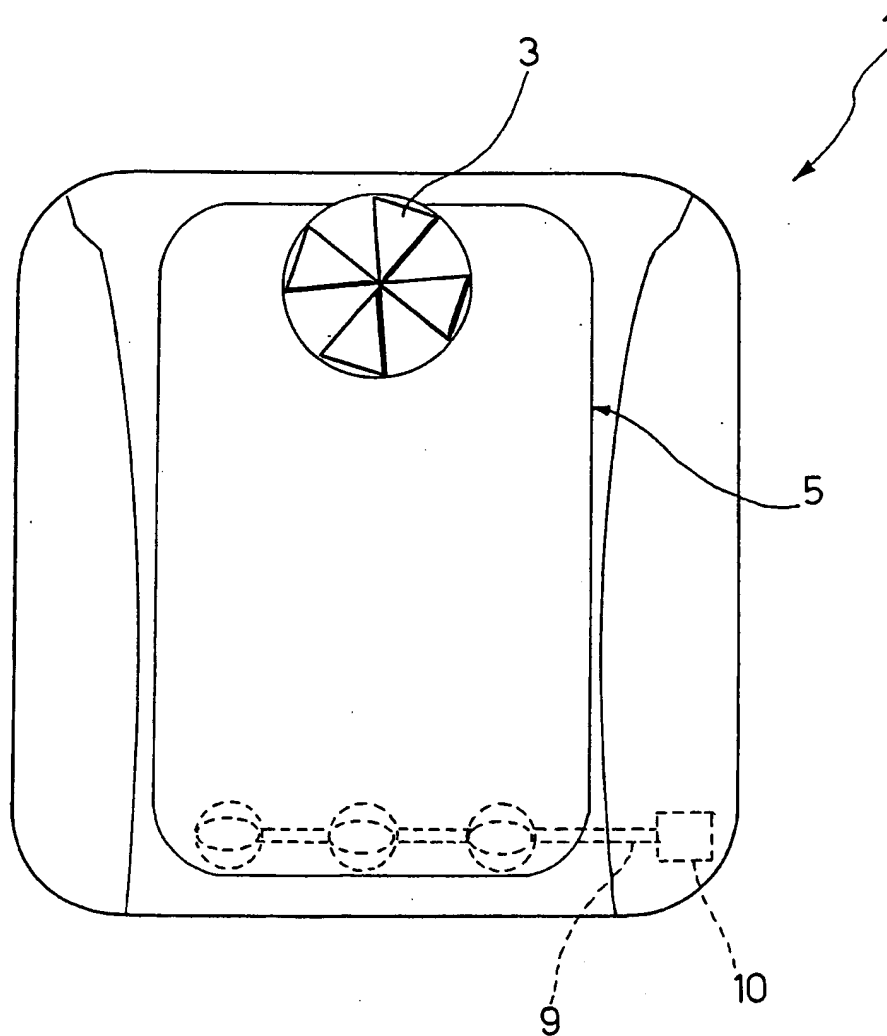
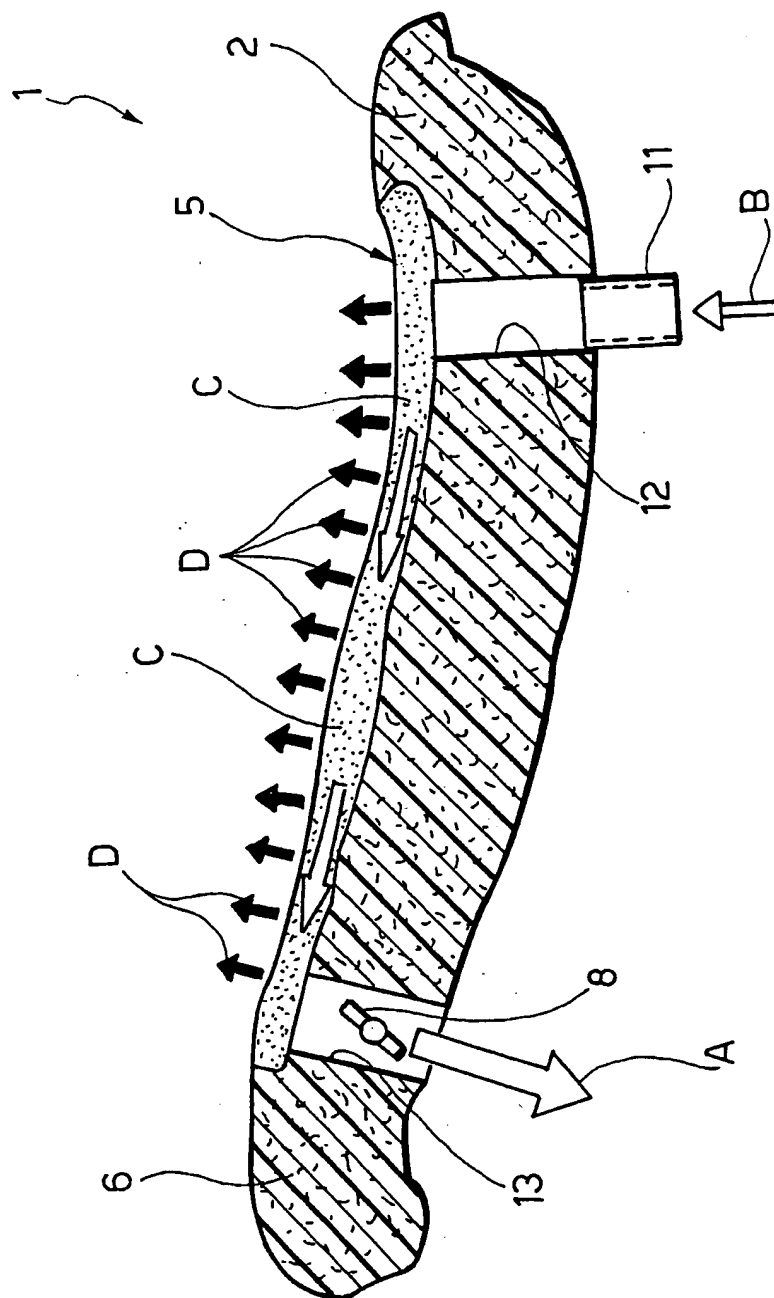


FIG. 3



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/05305

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B60N2/56

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B60N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 834 420 A (JC ASSOCIATES CO LTD) 8 April 1998 (1998-04-08)	1,3,8
A	column 4, line 29 -column 7, line 28; figures 1-28	4
X	US 5 176 424 A (FUJISE KAZUKI ET AL) 5 January 1993 (1993-01-05)	1,3,4,7
	column 1, line 10 -column 2, line 16; figures 1-72	
Y	DE 197 03 516 C (DAIMLER BENZ AG) 7 May 1998 (1998-05-07)	1,2,8
A	column 2, line 19 -column 3, line 34; figure	3,7
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

29 September 2000

Date of mailing of the international search report

06/10/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Gatti, C

# INTERNATIONAL SEARCH REPORT

Inter nal Application No

PCT/EP 00/05305

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 299 04 238 U (ZHENG HAI BIN ; ZHENG HAI BO (CN); CHEN MING GUI (HK)) 24 June 1999 (1999-06-24) page 2, line 12 - line 14; figures 1,2 ---	1,2,8
A	DE 198 05 174 C (DAIMLER CHRYSLER AGC) 2 June 1999 (1999-06-02) abstract; figures 1-3 ---	1,2,7,8
A	US 5 626 021 A (GREGORY CHRISTIAN T ET AL) 6 May 1997 (1997-05-06) abstract; figures 2,4,6,8-11 ---	1,3,8
A	US 5 138 851 A (MARDIKIAN ALBERT) 18 August 1992 (1992-08-18) abstract; figures 1,2,4-11 ---	1,3,8
A	WO 97 09909 A (WALLMAN KNUT OLOF LENNART ; WALINOV AB (SE)) 20 March 1997 (1997-03-20) ---	
A	US 4 685 727 A (VOSS HANS W ET AL) 11 August 1987 (1987-08-11) ---	
A	GB 957 135 A (PEDRICK) -----	

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 00/05305

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0834420 A	08-04-1998	JP 2943729 B JP 10108757 A JP 11070030 A AU 702395 B AU 3991497 A BR 9707755 A CN 1180507 A US 5921858 A	30-08-1999 28-04-1998 16-03-1999 18-02-1999 09-04-1998 23-11-1999 06-05-1998 13-07-1999
US 5176424 A	05-01-1993	JP 2077211 A JP 2041115 A EP 0345806 A	16-03-1990 09-02-1990 13-12-1989
DE 19703516 C	07-05-1998	FR 2759038 A GB 2321722 A,B IT RM980051 A JP 10215979 A US 5934748 A	07-08-1998 05-08-1998 26-07-1999 18-08-1998 10-08-1999
DE 29904238 U	24-06-1999	AU 713840 A FR 2782445 A GB 2340743 A NL 1011506 C	09-12-1999 25-02-2000 01-03-2000 22-02-2000
DE 19805174 C	02-06-1999	NONE	
US 5626021 A	06-05-1997	US 5524439 A AU 3243795 A CN 1158655 A EP 0775284 A JP 10504977 T WO 9605475 A AU 1184195 A DE 69425156 D EP 0730720 A JP 9505497 T SG 49265 A WO 9514899 A	11-06-1996 07-03-1996 03-09-1997 28-05-1997 19-05-1998 22-02-1996 13-06-1995 10-08-2000 11-09-1996 03-06-1997 18-05-1998 01-06-1995
US 5138851 A	18-08-1992	NONE	
WO 9709909 A	20-03-1997	SE 504973 C CA 2231999 A EP 0969751 A JP 2000504237 T SE 9503183 A US 6048024 A	02-06-1997 20-03-1997 12-01-2000 11-04-2000 15-03-1997 11-04-2000
US 4685727 A	11-08-1987	DE 3609095 A IT 1189738 B JP 1930082 C JP 6041244 B JP 62001621 A	09-10-1986 04-02-1988 12-05-1995 01-06-1994 07-01-1987
GB 957135 A		NONE	